

IN THE CLAIMS:

Please cancel Claims 3 and 10 without prejudice or disclaimer of subject matter, and amend Claims 1, 2, 4, 6 to 9, 11 and 12 as shown below. The claims, as pending in the subject application, now read as follows:

1. (Currently amended) An image processing apparatus, comprising:
a transformation section, arranged to transform means for transforming data space of an input image to discrete multi-resolution space and outputting a discrete multi-resolution representation of the input image;
a detector, arranged to detect detecting means for detecting a singularity in the input image;
an extractor, arranged to extract extracting means for extracting a local pattern in the neighborhood of each singularity in coordinate of the discrete multi-resolution representation of the input image, with regard to each of a plurality of depths;
a code book creator, arranged to create quantizing means for creating a quantization code book by registering based upon the extracted local pattern as a representative vector with a code word; and
a calculator, arranged to calculate an inner product of any two representative vectors in the code book;
a remover, arranged to remove one of the two representative vectors if the inner product is larger than a predetermined value;

a quantization section, arranged to replace replacing each local pattern of respective depths of the said discrete multi-resolution representation by a code word using the code book; and

an encoder, arranged to algebraically encode encoding means for algebraic encoding data which includes position coordinates of the singularity in the input image and the code word provided by said quantization section quantizing means.

2. (Currently amended) The apparatus according to claim 1, further comprising a counter arranged to count counting means for counting frequency of occurrence of the said local pattern, wherein said code book creator registers a local pattern in the quantizing means creates a code book when the frequency counted based upon results of counting performed by said counter is higher than a threshold counting means.

3. (Canceled)

4. (Currently amended) The apparatus according to claim 2, further comprising:

a memory, arranged to store means for storing degree of conformity or quantization error, calculated by said quantization section quantizing means, when the local pattern is allocated to a representative vector; and

a decider deciding means which, on the basis of the degree of conformity or quantization error, arranged to decide is for deciding the order relating to the perspective depth between any two representative vectors contained in the code data; ;

wherein said encoder encoding means encodes the order relating to the perspective depth.

5. (Original) An image processing apparatus comprising the image processing apparatus described in claim 4, wherein said image processing apparatus is applied to image recognition to retrieve image data from a partial image.

6. (Currently amended) An image processing apparatus comprising:

a decoder, arranged to decode decoding means for decoding a code generated by the image processing apparatus described in claim 4;

an inverse quantization section, arranged to generate quantizing means for generating a local pattern from a code word contained in code data decoded by said decoder decoding means; and

a synthesizer, arranged to combine synthesizing means for combining a plurality of local patterns, which have been generated by said inverse quantization section quantizing means, based upon position coordinates of a singularity decoded by said decoder decoding means, and order information relating to depth of a plurality of representative vectors.

7. (Currently amended) The apparatus according to claim 6, further comprising a memory arranged to store means for storing code data and output outputting the code data stored in said memory means to said decoder decoding means.

8. (Currently amended) An image processing method, comprising the steps of:

transforming data space of an input image to discrete multi-resolution space and outputting a discrete multi-resolution representation of the input image;

detecting a singularity in the input image;

extracting a local pattern in the neighborhood of each singularity in the coordinate of said discrete multi-resolution representation of the input image, with regard to each of a plurality of depths;

creating a quantization code book by registering based upon the extracted local pattern as a representative vector with a code word;

calculating an inner product of any two representative vectors in the code book;

removing one of the two representative vectors if the inner product is larger than a predetermined value; and

replacing each local pattern of respective depths of the said discrete multi-resolution representation by a code word using the code book; and

algebraically encoding data which includes position coordinates of the singularity in the input image and the code word obtained in the replacing said creating step.

9. (Currently amended) The method according to claim 8, further comprising a step of counting frequency of occurrence of the said local pattern, wherein the said creating step registers a local pattern in the creates a code book when the frequency

counted based upon results of counting obtained in the said counting step is higher than a threshold.

10. (Canceled)

11. (Currently amended) The method according to claim 9, further comprising the steps of:

calculating, in the said creating step, degree of conformity or quantization error when the local pattern is allocated to a representative vector; and
deciding the order relating to the perspective depth between any two representative vectors contained in the code data based on the degree of conformity or quantization error,

wherein the said encoding step encodes the order relating to the perspective depth.

12. (Currently amended) The method according to claim 11, further comprising the steps of:

decoding a code encoded in the said encoding step;
generating a local pattern from a code word contained in code data decoded in the said decoding step; and
combining a plurality of local patterns, which have been generated in the said quantizing step, based upon position coordinates of a singularity decoded in the said

decoding step, and order information relating to perspective depth of a plurality of representative vectors.